HOT TOPIC

Koa-munching moth outbreak in Hawai'i Volcanoes NP

Rain before the clouds - "*While conducting vegetation fieldwork in the Mauna Loa Strip, one week it seemed like it was raining caterpillars. The next week we walked through clouds of moths.*" –M. Simon, NPS

Over the past few months, koa (*Acacia koa*) forests on the Big Island of Hawaii, including those at upper elevations within the Mauna Loa Strip section of Hawai‘i Volcanoes National Park (HAVO), have experienced a dramatic outbreak of the koa looper (*Scotorythra paludicola*). This native caterpillar feeds almost exclusively on koa foliage. While this event is not unique, it is a relatively rare phenomenon, having been documented only 12 times in the past 120 years. The total area affected by the outbreak has not been determined, but nearly all large stands of koa on the island, ranging from windward Mauna Kea to the southern flanks of Mauna Loa to the Pu‘u Wa‘awa‘a region of Hualālai, have been impacted to some extent. In many areas, massive caterpillar feeding has resulted in complete defoliation of the trees. This outbreak appears to represent the largest ever recorded in Hawaii.

Within HAVO, the outbreak has been most evident along Mauna Loa Road, particularly between about the 1,500 and 2,000 m elevation. Starting in early May 2013, caterpillars could easily be observed feeding on the "leaves" (phyllodes) of nearly every koa inspected in that area, particularly trees that were producing new, highly palatable foliage at that time. As of the middle of June, the caterpillars largely finished feeding and most appeared to be in the pupal stage (transforming into moths), or in some instances had already emerged and were seen flying in the area. Within a week or two, huge numbers of koa looper moths may be visible along the upper section of Mauna Loa Road. Where these moths go and whether or not they start a new outbreak is unclear. There is still much koa foliage at lower elevations within the park (e.g., near Kīpukapuaulu, around Kīlauea Crater, and along Chain of Craters Road) that could support a second wave of infestation.

Under normal conditions, the koa looper is just one of several species of *Scotorythra* that can be found feeding on koa foliage. It is one of the smaller *Scotorythra* species and generally goes unnoticed, consuming only a small percentage of foliage. Why does the koa looper experience occasional outbreaks? No one knows for sure, but it may be due to a relaxation in predation or pathogen pressure, a decrease in chemical defenses within koa foliage, favorable climatic conditions, or some other factor. And while it is unknown what initiates the outbreak, it is also unknown what causes it to stop.

Observations from previous outbreaks suggest that the mortality of healthy koa following defoliation is very low, although death rates as high as 33% have been found in areas where trees were stressed prior to the outbreak.

While concern for the health of koa in HAVO is real, as tree death would change the forests and affect ecosystem processes, the large number of caterpillars during an outbreak likely influences forest communities in less obvious ways.

In some ways, caterpillar outbreaks may even be beneficial. For example, it is known that caterpillars are important food for birds, particularly during the nesting season (which is generally concurrent with the outbreaks). Caterpillar levels not seen for decades such as we are experiencing right now, may result in higher nesting success for native species such as the Hawai‘i ‘amakihi, ‘apapane and ‘elepaio.

The full extent of the outbreak will not be known for many months, but it is clear that HAVO, like much of the Big Island, is experiencing a spectacular natural phenomenon involving an often overlooked native insect and its more famous host plant.

–Robert Peck, HCSU, UH-Hilo Entomologist